Λ and K^0_s production in Au+Au collisions between 2 and 8 AGeV

D. Best, H. Liu, G. Odyniec, D.L. Olson, S. Panitkin, G. Rai, H.G. Ritter, L. S. Schroeder, T.J.M. Symons, and the E895 Collaboration

It is believed that information from a high–density and high–temperature phase of nuclear matter created in nuclear collisions may be carried by strange particles (refer to recent reviews [1]). It is our interest to establish the relevance of a strangeness signal for diagnosis of a possible formation of a quark–gluon plasma (QGP).

The E895 experiment [2] has measured using its 4π detector (cnr2.kent.edu/$\sim$ e895) Au+Au collisions at the four different incident beam energies 2, 4, 6 and 8 AGeV (about 200,000 – 300,000 central triggers). The DST production for 2, 4 and 6 AGeV has been finished using the PDSF (pdsf.nersc.gov) workstation farm. The 8 AGeV data set will be finished shortly.

As a first step we established the total yields of Λ and K^0_s particles (see last years contribution for the Λ yields), collectively called V0 particles due to their characteristic decay topology. In order to apply the proper efficiency corrections a simulation has been developed that enables us to embed Monte Carlo particles in real events. In this way the high track density environment is fully taken into account. This is one of the major technical advancements in our analysis. As an example Figure 1 shows the excitation function of K^0_s 4π yields in central (10%) Au+Au collisions between 2 and 8 AGeV. Our data are shown with an earlier result from E891 (about 11 AGeV). In comparison are plotted the K^0_s yields from minimum bias proton–proton collisions scaled according to the number of participant nucleons in an Au+Au collision. This result is expected if a nucleus–nucleus collision would be represented by a mere superposition of pp collisions. It is evident that additional particle production via inelastic multiple scattering, resonance production or novel processes are necessary to explain the results. Also shown are the predictions of various transport models which generally tend to underestimate the K^0_s 4π yields in central collisions. A comparison of rapidity and transverse momentum distributions for Λ and K^0_s particles show the discrepancy is most prominent at midrapidity and low transverse momenta respectively (not shown).

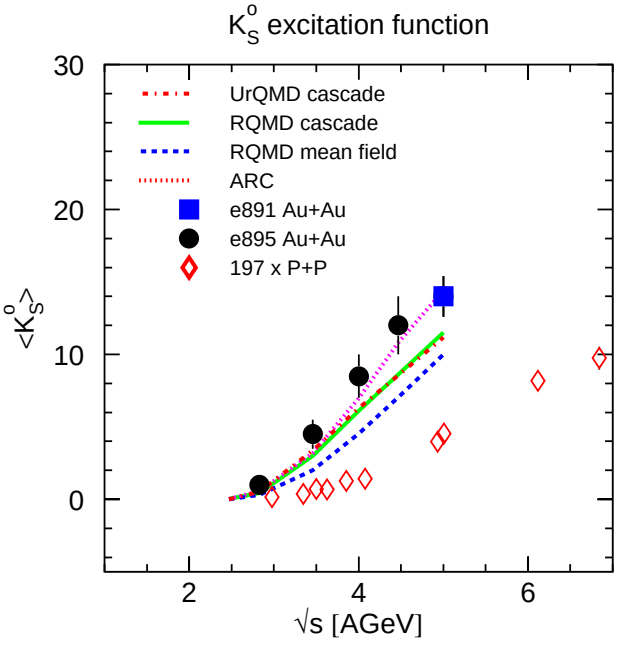

Figure 1: Excitation function of K^0_s 4π yields in central (10%) Au+Au collisions between 2 and 8 AGeV. See text for explanation.

References

[1] P. Senger and H. Stroebele, nucl-ex/9810007, S. Bass et al., hep-ph/9810486

[2] G. Rai et al.; LBL Report 5399, August 1993